

**ABSTRACT OF THE DISCLOSURE**

Process for preparing a two layer metal palladium or palladium alloy composite membrane consisting of a porous substrate support and a palladium or palladium alloy membrane by rinsing/washing and drying the porous substrate support, treating the porous substrate support with a pore filler in order to decorate the pores of the support and the disfigurements of the substrate surface, sensitizing and activating with a palladium solution the decorated substrate support, and plating the resulting support with a palladium solution to form the two layer composite membrane, drying. The resulting composite membrane is subjected to a post-processing where the pore fillers residing in the pore-channels of the porous substrate are partly removed or reduced in volume through heating.